Section I. (Amendment to the Claims)

Please amend claims 1, 3, 7-8, 10-11, 15, 20-21, 23, 24, 26, 27-28, 32, 35, 39, and 49-51, as set out below in the listing of claims 1-51 of the application.

1. (Currently amended) A plasma-assisted dry etching method for etching ~~a~~ an Ir-based noble metal material, said method comprising:

   contacting the Ir-based noble metal material with an energized plasma composition comprising an etching species mixture for sufficient time to at least partially etch said Ir-based noble metal material, wherein the etching species mixture comprises (i) at least one halogenated compound selected from the group consisting of organic halogenated compounds, inorganic halogenated compounds and mixtures thereof, and (ii) an oxidizing agent selected from the group consisting of ~~oxygen~~ O_2 and ~~ozone~~ O_3 gases, wherein the volumetric ratio of said at least one halogenated compound over said oxidizing agent is in a range of from about 4 to about 0.5, and wherein the energized plasma composition contacting the Ir-based noble metal material lacks nitrogen- and phosphorous-containing species~~, and wherein the noble metal material comprises Ir~~.

2. (Cancelled).

3. (Currently amended) The method according to claim 1, wherein the etch species mixture comprises C_2F_6 ~~in the presence of~~ and O_2.

4. (Original) The method according to claim 1, wherein the energized plasma is energized by electromagnetic radiation.

5. (Original) The method according to claim 4, wherein the electromagnetic radiation has a frequency ranging from about 1×10^3 to about 1×10^{12} Hertz.

6. (Cancelled).

7. (Currently amended) The method according to claim 4, wherein the Ir-based noble metal material comprises IrO_2.

8. (Currently amended) ~~The method according to claim 3~~ A plasma-assisted dry etching method for etching an Ir-based noble metal material, said method comprising:

contacting the Ir-based noble metal material with an energized plasma composition comprising an etching species mixture for sufficient time to at least partially etch said Ir-based noble metal material, wherein the etching species mixture comprises (i) at least one halogenated compound selected from the group consisting of organic halogenated compounds, inorganic halogenated compounds and mixtures thereof, (ii) an oxidizing agent selected from the group consisting of oxygen and ozone, ~~wherein the energized plasma further comprises~~ and (iii) a co-reactant to assist in the volatilization and removal of iridium products from the Ir-based noble metal material, and wherein the energized plasma composition contacting the Ir-based noble metal material lacks nitrogen- and phosphorous-containing species.

9. (Previously presented) The method according to claim 8 wherein the co-reactant precursor is selected from the group consisting of elemental silicon and quartz.

10. (Currently amended) ~~The method according to claim 3~~ A plasma-assisted dry etching method for etching an Ir-based noble metal material, said method comprising:

contacting the Ir-based noble metal material with an energized plasma composition comprising an etching species mixture for sufficient time to at least partially etch said Ir-based noble metal material, wherein the etching species mixture comprises ~~wherein the etch species mixture further comprises~~ XeF_2, and wherein the energized plasma composition contacting the Ir-based noble metal material lacks nitrogen- and phosphorous-containing species.

11. (Currently amended) The method according to claim ~~1~~ 3, wherein the ~~oxidizing gas comprises an oxidant selected from the group consisting~~ volumetric ratio of C_2F_6 over O_2~~, and O_3~~ is about 1.

12. (Previously presented) The method according to claim 1, wherein the energized plasma is energized in a downstream microwave processing system.

13. (Original) The method according to claim 12, further comprising the removing at least one iridium product in the course of the etching process.

14. (Original) The method according to claim 1, wherein the halogenated organic compound comprises a compound selected from the group consisting of C_2F_6, $C_2Cl_3F_3$, C_4F_8, C_5F_8, C_3F_8, $C_2Cl_2F_4$, C_2ClF_3, $CClF_3$, CCl_3F and CCl_2F_2.

15. (Currently amended) ~~The method according to claim 14~~ A plasma-assisted dry etching method for etching an Ir-based noble metal material, said method comprising:

contacting the Ir-based noble metal material with an energized plasma composition comprising an etching species mixture for sufficient time to at least partially etch said Ir-based noble metal material,, wherein the etching species mixture comprises (i) a halogenated organic compound ~~comprises~~ C_2F_6, ~~in combination with the~~ (ii) a halogenated inorganic compound XeF_2, and (iii) an oxidizing gas selected from the group consisting of oxygen and ozone, and wherein the energized plasma composition contacting the Ir-based noble metal material lacks nitrogen- and phosphorous-containing species.

16. (Original) The method according to claim 15, wherein the energized plasma further comprises reactive species formed by reacting C_2F_6 with elemental silicon.

17. (Original) The method according to claim 16, further comprising the removal of at least one iridium product during the etching process.

18. (Original) The method according to claim 17, wherein the at least one iridium product comprises an iridium-containing composition selected from the group consisting of $IrSi_2F_4$, $IrSi_3F_6$, and $IrSi_4F_6$.

19. (Original) The method according to claim 16, wherein the oxidizing gas comprises O_2.

20. (Currently amended) The method according to claim 1, wherein the Ir-based noble metal material is deposited on a high temperature dielectric material or ferroelectric material.

21. (Currently amended) A method of fabricating a microelectronic device structure, comprising:

(a) depositing ~~a~~ an Ir-based noble metal material on a substrate~~, wherein the noble metal material comprises Ir~~;

(b) forming a pattern on the deposited Ir-based noble metal material of a desired configuration;

(c) contacting the deposited Ir-based noble metal material with an energized plasma comprising an etching species mixture, to thereby etch the Ir-based noble metal material, wherein the etching species mixture comprises (i) at least one halogenated compound selected from the group consisting of organic halogenated compounds, inorganic halogenated and mixtures thereof, and (ii) an oxidizing agent selected from the group consisting of ~~oxygen~~ O_2 and ~~ozone~~ O_3 gases, wherein the volumetric ratio of said at least one halogenated compound over said oxidizing agent is in a range of from about 4 to about 0.5, and wherein the energized plasma composition contacting the noble metal material lacks nitrogen-and phosphorous-containing species; and

(d) continuing step (c) for a sufficient time and under sufficient conditions to form the microelectronic device structure or a precursor thereof.

22. (Cancelled).

23. (Currently amended) The method according to claim 21, wherein the etch species mixture comprise C_2F_6 ~~in the presence of~~ and O_2.

24. (Currently amended) The method according to claim 23, **wherein** the energized plasma is energized by electromagnetic radiation.

25. (Previously presented) The method according to claim 21, wherein the electromagnetic radiation has a frequency ranging from about 1×10^3 to about 1×10^{12} Hertz.

26. (Currently amended) ~~The method according to claim 25~~ A method of fabricating a microelectronic device structure, comprising:

(a) depositing an Ir-based noble metal material on a substrate;

(b) forming a pattern on the deposited Ir-based noble metal material of a desired configuration;

(c) contacting the deposited Ir-based noble metal material with an energized plasma comprising an etching species mixture, to thereby etch the Ir-based noble metal material, wherein the etching species mixture comprises (i) at least one halogenated compound selected from the group consisting of organic halogenated compounds, inorganic halogenated and mixtures thereof, (ii) an oxidizing agent selected from the group consisting of oxygen and ozone, ~~wherein the energized plasma further comprises~~ and (iii) a co-reactant to assist in volatilization and removal of iridium products from the Ir-based noble metal material, wherein the co-reactant ~~precursor~~ is selected from the group consisting of elemental silicon and quartz, and wherein the energized plasma composition contacting the Ir-based noble metal material lacks nitrogen-and phosphorous-containing species; and

(d) continuing step (c) for a sufficient time and under sufficient conditions to form the microelectronic device structure or a precursor thereof.

27. (Currently amended) The method according to claim ~~21~~ 23, wherein the ~~oxidizing gas includes an oxidant selected from the group consisting~~ volumetric ratio of C_2F_6 over O_2~~, and O_3~~ is about 1.

28. (Currently amended) ~~The method according to claim 23~~ A method of fabricating a microelectronic device structure, comprising:

(a) depositing an Ir-based noble metal material on a substrate;

(b) forming a pattern on the deposited Ir-based noble metal material of a desired configuration;

(c) contacting the deposited Ir-based noble metal material with an energized plasma comprising an etching species mixture, to thereby etch the Ir-based noble metal material, wherein the etching species mixture comprises ~~wherein the energized plasma further comprises~~ XeF_2, and wherein the energized plasma composition contacting the Ir-based noble metal material lacks nitrogen-and phosphorous-containing species; and

(d) continuing step (c) for a sufficient time and under sufficient conditions to form the microelectronic device structure or a precursor thereof.

29. (Original) The method according to claim 26, further comprising removing at least one iridium product during the etching process.

30. (Original) The method according to claim 21, wherein the halogenated organic compound comprises a compound selected from the group consisting of C_2F_6, $C_2Cl_3F_3$, C_4F_8, C_5F_8, C_3F_8, $C_2Cl_2F_4$, C_2ClF_3, $CClF_3$, CCl_3F and CCl_2F_2.

31. (Previously presented) The method according to claim 21, wherein the halogenated organic compound comprises C_2F_6.

32. (Currently amended) ~~The method according to claim 31~~ A method of fabricating a microelectronic device structure, comprising:

(a) depositing an Ir-based noble metal material on a substrate;

(b) forming a pattern on the deposited Ir-based noble metal material of a desired configuration;

(c) contacting the deposited Ir-based noble metal material with an energized plasma comprising an etching species mixture, to thereby etch the Ir-based noble metal material, wherein the etching species mixture comprises (i) C_2F_6, and (ii) ~~wherein the energized plasma further comprises~~ reactive species formed by reacting C_2F_6 with a co-reacting species selected from the group consisting of elemental silicon and quartz, and wherein the energized plasma composition contacting the Ir-based noble metal material lacks nitrogen-and phosphorous-containing species; and

(d) continuing step (c) for a sufficient time and under sufficient conditions to form the microelectronic device structure or a precursor thereof.

33. (Original) The method according to claim 32, further comprising removal of at least one iridium product in the etching process.

34. (Original) The method according to claim 33, wherein the at least one iridium product comprises an iridium composition selected from the group consisting of $IrSiF_3$ $IrSi_2F_4$, $IrSi_3F_6$, and $IrSi_4F_6$.

35. (Currently amended) A method for removing a noble metal residue from a microelectronic device structure, the method comprising:

contacting the microelectronic device, having deposited thereon a noble metal residue selected from the group consisting of platinum, palladium, iridium and rhodium, with a gas-phase reactive composition comprising (i) a halide component selected from the group consisting of SF_6, SiF_4, Si_2F_6, SiF_2 radical and SiF_3 radical, and (ii) an oxidizing gas selected from the group consisting of ~~oxygen~~ O_2 and ~~ozone~~ O_3 gases, in an amount to remove noble metal residue from the microelectronic device structure, wherein the volumetric ratio of said halide component over said oxidizing gas is in a range of from about 4 to about 0.5, and wherein the gas-phase reactive composition lacks nitrogen-and phosphorous-containing species.

36. (Original) The method according to claim 35, wherein the halide is selected from the group consisting of SF_6, SiF_4 and Si_2F_6.

37. (Original) The method according to claim 35, wherein the halide comprises SF_6.

38. (Original) The method according to claim 35, wherein the halide is selected from the group consisting of SiF_2 and SiF_3 radicals.

39. (Currently amended) ~~The method according to claim 35~~ A method for removing a noble metal residue from a microelectronic device structure, the method comprising:

contacting the microelectronic device, having deposited thereon a noble metal residue selected from the group consisting of platinum, palladium, iridium and rhodium, with a gas-phase reactive composition comprising (i) a halide component ~~wherein the halide is~~ selected from the group consisting of SiF_2 and SiF_3 radicals ~~and the halide is~~ generated by reaction of XeF_2 with silicon, and (ii) an oxidizing gas selected from the group consisting of oxygen and ozone, in an amount to remove noble metal residue from the microelectronic device structure, wherein the gas-phase reactive composition lacks nitrogen-and phosphorous-containing species.

40. (Original) The method according to claim 35, wherein the halide is selected from the group consisting of SiF_2 and SiF_3 radicals and the halide is generated by passing SiF_4 through an energetic dissociation source.

41. (Original) The method according to claim 40, wherein the energetic dissociation source is selected from the group consisting of plasma sources, ion sources, ultraviolet sources and laser sources.

42. (Original) A method for removing from a microelectronic device structure, a noble metal residue comprising iridium, the method comprising:

contacting the microelectronic device structure with a gas-phase reactive halide comprising XeF_2 and an agent to assist in volatilizing and at least partially removing the noble metal residue from the microelectronic device structure.

43. (Original) The method according to claim 42, wherein the agent is selected from the group consisting of carbon monoxide, trifluorophosphine, and trialkylphosphines.

44. (Original) The method according to claim 43, wherein the agent further comprises an iridium halide species selected from the group consisting of $Ir(X)_1$, $Ir(X)_3$, $Ir(X)_4$ and $Ir(X)_6$, wherein X represents the halide of the reactive halide composition.

45. (Original) The method according to claim 42, wherein, the gas-phase reactive halide composition further comprises a gas phase reactive halide species selected from the group consisting of SiF_4, Si_2F_6, SiF_2 radical and SiF_3 radical; and the microelectronic device structure is further contacted with an agent to assist in volatilizing and removing the noble metal residue on the microelectronic device structure.

46. (Original) The method according to claim 42, wherein the agent is selected from the group consisting of Lewis bases and electron back-bonding species.

47. (Original) The method according to claim 42, further comprising disposing the microelectronic device structure in a chamber and introducing a gas phase reactive halide composition selected from the group consisting of SF_6, SiF_4 and Si_2F_6 that is continuously flowed through the chamber, in combination with an energetic dissociation source selected from the group consisting of plasma sources, ion sources, ultraviolet sources and laser sources.

48. (Original) The method according to claim 42, further comprising disposing the microelectronic device structure in a chamber and introducing a gas phase reactive halide composition selected from the group consisting of SiF_2 and SiF_3 that is continuously flowed through the chamber, in combination with an energetic dissociation source selected from the group consisting of plasma sources, ion sources, ultraviolet sources and laser sources.

49. (Currently amended) A method for removing from a microelectronic device structure a noble metal residue including at least one metal selected from the group consisting of platinum, palladium, iridium and rhodium, the method comprising:

contacting the microelectronic device structure with a gas-phase reactive composition comprising: (i) SiF_4 in a sufficient amount to at least partially remove noble metal residue, and (ii) an oxidizing gas selected from the group consisting of O_2 and O_3 gases,

wherein the ~~gas-phase composition further comprises an~~ volumetric ratio of SiF_4 over said oxidizing gas ~~selected from the group consisting of oxygen and ozone~~ is in a range of from about 4 to about 0.5.

50. (Currently amended) A method for removing from a microelectronic device structure a noble metal residue including at least one metal selected from the group consisting of platinum, palladium, iridium and rhodium, the method comprising:

contacting the microelectronic device structure with a gas-phase reactive halide composition comprising (i) Si_2F_6 in a sufficient amount to at least partially remove noble metal residue, and (ii) an oxidizing gas selected from the group consisting of O_2 and O_3 gases,

wherein the volumetric ratio of Si_2F_6 over said oxidizing gas is in a range of from about 4 to about 0.5.

51. (Currently amended) A method for removing from a microelectronic device structure a noble metal residue including at least one metal selected from the group consisting of platinum, palladium, iridium and rhodium, the method comprising contacting the microelectronic device structure with a gas-phase reactive ~~halide~~ composition comprising: (i) a halide component selected from the group consisting of SF_6, SiF_4, Si_2F_6, SiF_2 radical, SiF_3 radical, and XeF_2, in an

amount effective to at least partially remove the noble metal residue,~~; the gas phase composition (a) further comprising~~ and (ii) an oxidizing gas selected from the group consisting of ~~oxygen~~ O_2 and ~~ozone~~ O_3, wherein the volumetric ratio of said halide component over said oxidizing gas is in a range of from about 4 to about 0.5, and ~~(b) lacking~~ wherein said gas-phase reactive composition a nitrogen- and phosphorous-containing species.